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Date of mailing (day/month/year) 16 March 2000 (16.03.00)	
International application No. PCT/SE99/01205	Applicant's or agent's file reference 51351-55813
International filing date (day/month/year) 02 July 1999 (02.07.99)	Priority date (day/month/year) 02 July 1998 (02.07.98)
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>A61F 13/15, A61L 15/24</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 00/01335</b> <b>(43) International Publication Date:</b> 13 January 2000 (13.01.00)
<b>(21) International Application Number:</b> PCT/SE99/01205 <b>(22) International Filing Date:</b> 2 July 1999 (02.07.99) <b>(30) Priority Data:</b> 9802370-8                      2 July 1998 (02.07.98)                      SE <b>(71) Applicant (for all designated States except US):</b> SCA HYGIENE PRODUCTS AB [SE/SE]; S-405 03 Göteborg (SE). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> LAKSO, Elisabeth [SE/SE]; Tallivälvägen 21, S-444 46 Stenungsund (SE). SIMMONS, Eva [SE/SE]; Brobergsgatan 7, S-431 66 Mölndal (SE). NURMI, Hannele [SE/SE]; Kroge Krapp 6, S-471 42 Rönäng (SE). JÖNBRINK, Anna, Karin [SE/SE]; Ryd Västergårdsväg 65 B, S-443 51 Lerum (SE). SILFVERSTRAND, Anders [SE/SE]; Rådestocksvägen 2 A, S-435 44 Mölnlycke (SE). <b>(74) Agents:</b> BERG, S., A. et al.; Albihns Patentbyrå Stockholm AB, P.O. Box 5581, S-114 85 Stockholm (SE).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Swedish).</i>
<b>(54) Title:</b> USE OF A POLYETHENE MATERIAL PRODUCED FROM RENEWABLE RAW MATERIAL AS COMPONENT OF AN ABSORBENT ARTICLE, AND THE ABSORBENT ARTICLE		
<b>(57) Abstract</b>  <p>The use of material that contains polyethene produced from renewable raw material as a component of an absorbent article, and the absorbent article. A method of producing an absorbent article, comprising producing ethene from renewable raw material, preferably ethanol, polymerising the ethene to polyethene, producing film that contains said polyethene, forming at least one article component from said film, feeding the component into a machine together with an absorbent body and possible other sheets and joining said component to the absorbent article. A component of an absorbent article made of a material that includes polyethene, said polyethene having been produced from renewable raw material. Package including film material which contains polyethene produced from renewable raw material.</p>		

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USE OF A POLYETHENE MATERIAL PRODUCED FROM RENEWABLE RAW  
MATERIAL AS COMPONENT OF AN ABSORBENT ARTICLE, AND THE  
ABSORBENT ARTICLE.

5 The present invention relates to the use of material that  
contains polyethene produced from renewable raw material as a  
component of an absorbent article, absorbent articles, a  
method of producing an absorbent article, absorbent article  
components, and packaging material or units comprised of  
10 material that contains polyethene produced from renewable raw  
material.

Much thought is given to the care and protection of the  
environment in present-day societies. Newspapers, packaging  
15 materials comprised of glass, metal, paper, plastic, etc.,  
are recycled with the purpose of conserving existing  
resources, such as oil, forest and metal. It is desirable to  
use materials that are as environmentally friendly as  
possible and that are reasonable in the manufacture of  
20 products. This is also very important with regard to the  
manufacture of sanitary and hygiene products for one-time use  
only, such as diapers, sanitary napkins, incontinence  
protectors or napkins, panty liners, etc., and with regard to  
the manufacture of packaging materials and packaging units.  
25 In addition to conserving our natural resources, it is also  
necessary to consider the environment with respect to the  
waste and contaminants to which it is subjected. Waste  
materials are dumped in garbage tips, where they are kept  
and, in the long term, break down or are alternatively  
30 incinerated. When we use so-called disposable articles and  
disposable packaging and wrapping materials, these articles  
and materials also land-up in garbage tips, which expand in  
size or are incinerated and therewith generate contaminants  
and carbon dioxide (CO<sub>2</sub>). This contributes to the undesired  
35 greenhouse effect and to the consumption of natural  
resources.

Part of the community's resources is based on plants (Plantea) that continuously reproduce. Other resources exist in limited quantities and are regenerated very slowly. Petroleum products are an example of such resources. The use of petroleum raw materials depletes existing resources available to the community. It has taken many years for the oil that we use today to form.

The object of the present invention is to assist in alleviating these problems and to provide an absorbent disposable product and a packaging material that is more environmentally friendly than their known counterparts.

This object is achieved in accordance with the invention by the use of a material which contains polyethene and which is produced from renewable raw material. By renewable raw material is meant here a material produced from plant-based material. The renewable raw material is produced by plant material. Plants can be renewed by planting new trees, new potatoes, sowing new seed, etc. The opposite of a product produced from a renewable raw material is a product which consumes raw material that cannot be renewed, for instance polyethene produced from petroleum raw products. In TNC's Energy dictionary, a renewable energy source is defined as an energy source that can be reproduced at the same rate as it is used. Examples of renewable energy sources are forest energy, energy forests and energy crops. The same significance of the term renewable is used here, even though it is not an energy source that is concerned but a raw material.

There are some examples of what some people consider to be environmentally friendly absorbent articles. One example is products that can be used several times, by washing the products between use. Cloth diapers are used in this way.

US-A-5,032,119 teaches a reusable cloth diaper. Environmentally friendly disposable products can be products that comprise components produced from degradable material, such as polycaprolactone, polylactide or latex material.

5 WO-A1-9407941 teaches a film produced from polylactide, which is biodegradable and can be composted and which can be used in diapers, for instance. Another degradable material that can be used in films comprises copolymers that include polycaprolactone and polylactide blocks, such material being  
10 described in WO-A1-9529200. This film can be used in diapers, for instance. Biodegradable latex material is used as film in diapers, as described in EP-A1-454 104. Polylactide is an example of renewable material that is used in absorbent articles. Starch, which is a renewable material, is also used  
15 in combination with polycaprolactone.

The invention relates to the use of material that contains polyethene produced from renewable raw material, as a component of an absorbent article, such as a diaper, sanitary  
20 napkin, incontinence protector, panty liner, a pant diaper or like articles.

The invention also relates to an absorbent article, such as a diaper, sanitary napkin, incontinence protector, panty liner,  
25 pant diaper or like article, where at least one component is comprised of a material that includes polyethene that has been produced from renewable raw material.

The invention also relates to an absorbent article which is enclosed in film packaging material that contains polyethene  
30 produced from renewable raw material, said package either containing one article or several articles.

The invention also relates to a method of producing an  
35 absorbent article, such as diaper, sanitary napkin,

incontinence protector, panty liner, pant diaper or like article.

The invention also relates to a component of an absorbent article, wherein the component may be a liquid-impermeable backing sheet, an outer sheet or top sheet, fastener means, or waist elastic, made of a material that contains polyethene that has been produced from renewable raw material.

Finally, the invention also relates to packaging material that includes film that consists of a material which includes polyethene that has been produced from renewable raw material.

The components of the absorbent articles in question are all those that can be produced from polyethene, and also other conceivable components that may possibly be produced from polyethene. Examples of components produced from polyethene are plastic sheets that function as liquid impermeable backing sheets on absorbent articles, waist elastic in diapers for instance, top sheets on sanitary napkins and panty liners for instance, and tape used as diaper fastening means.

Part of a packaging unit may comprise film material that includes polyethene. When the packaging unit is comprised of several parts, it is not necessary for all of these parts to consist of said material, but they may include another type of plastic film or some other suitable material, for instance. The aforesaid packaging part may also have a form other than film in packaging units that can conceivably be produced from polyethene.

Polyethene is at present produced by polymerisation of ethene obtained by thermal (vapour) and catalytic cracking of

different hydrocarbons, all from ethane derived from natural gas to crude oil.

The production of polyethene will now be described, such production being described in Textbook of Polymer Science, Third Edition, Fred W. Billmeyer, JR, A. Wiley-Interscience Publication John Wiley & Sons.

Ethene can be polymerised with benzene or chlorobenzene as a solvent. Both polymer and monomer in these compounds dissolve at the temperatures and pressures used, such that the reactions are purely solvent polymerisations. Water or other liquids can be added to drainoff reaction heat.

In continuous processes, there are used tubular reactors which may have diameters smaller than 2.5 cm and lengths of up to 30 m. The stainless steel pipe is filled with water, and ethene containing initiator and possibly benzene is introduced. Additional initiator and water or benzene can be injected into the system at one or more points along the pipe, or tube, so as to maintain the initiator concentration essentially constant through the reactor. Ten percent, or a higher percentage, of ethene is polymerised at the distal end of the reactor. The gas and liquid phases are continuously removed at this point and the polymer separated out. The ethene that remains is recycled, subsequent to being purified.

Another process uses bulk polymerisation in a tower-type reactor. Ethene containing trace quantities of oxygen is introduced into the reactor at 1500 atm and 190°C. The reaction is kept essentially isothermic and is carried out to a yield of 10-15%. The reactor outlet passes to a separation vessel in which unconverted ethene is removed for recycling. The molten polyethene is cooled to a temperature beneath its



crystalline melting point and passed through the usual terminating stages.

5 LDPE (low density polyethene) can be produced in the  
aforedescribed way, this polyethene being the polyethene used  
primarily in the manufacture of polyethene film.

10 HDPE (high density polyethene), which can also be used to  
produce film, can be manufactured in several ways, including  
radical polymerisation of ethene at extremely high pressures,  
coordination polymerisation of ethene, and polymerisation of  
ethene supported by metal oxide catalysts.

15 In coordination polymerisation of ethene, there is used a  
catalyst produced as a colloidal dispersion by reacting alkyl  
aluminium and  $\text{TiCl}_4$  in a solvent, such as heptane. Ethene is  
introduced into the reaction vessel under a weak pressure and  
at a temperature of 50-75°C. Polymerisation heat is removed  
by cooling. The polymer is produced in a powder or granule  
20 form, insoluble in the reaction mixture. The catalyst is  
destroyed at the end of the reaction process, by allowing  
water or alcohol to enter the system, and the polymer is  
filtered or centrifuged off, washed and dried.

25 Supportive metal oxide catalysts can be used in different  
working processes, including solid beds, moveable beds,  
fluidized beds and slurry processes. Ethene is supplied with  
a paraffin or cycloparaffin as an extender, at 60-200°C and a  
pressure of about 3.5 kPa. The polymer is recovered by  
30 cooling, or by solvent evaporation.

In the same process as that used to produce a HDPE, a  
polyethene having a certain degree of elasticity can be  
produced. In this case, there is used a metallocene catalyst  
35 and a small amount of some other monomer is added, such as  
hexene or butene.

Thus, at present ethene is taken from petroleum crude products, which are not renewable and which deplete natural resources in this respect. Furthermore, the incineration of polyethene results in the forming of carbon dioxide, which contributes to the undesired greenhouse effect.

According to the invention, renewable ethene is used to produce an environmentally friendly product, where the ethene is produced from a renewable raw material, such as ethanol. Ethanol is renewable when it is produced from a reproducible plant (*Plantae*). Sugar is converted to ethanol and carbon dioxide by fermentation under the influence of yeast fungi:

$C_6H_{12}O_6 \rightarrow 2 C_2H_5OH + 2 CO_2$ . Potatoes, seed, forest raw materials or other plants are used in the fermentation process. Every fruit, berry or plant constituent that includes sugar can be fermented.

Ethene is produced from the renewable ethanol, by dehydrating ethanol for instance. Alcohol loses a water molecule and forms alkene when heated with a strong acid. Ethanol is heated to 180°C with concentrated sulphuric acid:

$C_2H_5OH \text{ (conc. } H_2SO_4, 180^\circ C) \rightarrow C_2H_4 + H_2O$

Polyethene can be produced from the renewable ethene in the aforescribed manner, already known in the art. It is also known to produce ethene from ethanol in the manner described above. The novelty in the present context resides in the use of renewable raw materials in the manufacture of polyethene for use in absorbent articles, which according to the invention results in environmentally friendly absorbent articles. Polyethene is used as material in components of the article, for instance as liquid-impermeable backing sheets, outer sheets or top sheets, diaper fastening tape, or as waist elastic. The novelty also resides in the use of

renewable raw materials in manufacturing polyethene for use as packaging material.

5 An alternative to ethene produced from renewable ethanol is "cracking" of long carbon chains to ethene, such as the carbon chains of oils and fats. In this process, the long carbon chains of oils and fats are broken down to smaller molecules, of which some are ethene molecules. Naturally, in order to be renewable the oils and fats will be vegetable oil and fats. Many compounds can also be reacted to form ethene via ethanol, for instance acetic acid and ethylene oxide.

10 The invention relates to an entirely novel use of material that contains polyethene produced from renewable raw materials in absorbent articles and packaging materials.

15 It is not known in an industrial scale, to use polyethene that has been produced from renewable raw materials for the manufacture of environmentally friendly absorbent articles and environmentally friendly packaging materials which represent a lessening of the load on our environment and which do not deplete existing petroleum resources. Another advantage afforded by the invention is found in the possible incineration of disposable products and disposable packaging materials subsequent to their use. Incineration of polyethene generates carbon dioxide. This carbon dioxide contributes to the undesired greenhouse effect. When using renewable raw materials, however,  $\text{CO}_2$  is consumed in the formation of the plants. This positive effect is also obtained when the products or packaging materials are dumped on the garbage or rubbish tip, since  $\text{CO}_2$  has also been consumed in the formation of the plants in this case. The use of renewable raw materials thus has a mitigating effect on the greenhouse effect.

The invention will now be described in more detail with reference to the accompanying drawing, in which

Figure 1 is a sectioned view of an absorbent article, such as a diaper;

Figure 2 shows a diaper from above;

Figure 3 is a side view of an absorbent article packaged in polyethene film; and

Figure 4 is a side view showing several absorbent articles packaged in polyethene film.

Polyethene is produced from renewable raw material, processed and then used as components of an absorbent article, such as a diaper, sanitary napkin, incontinence protector, panty liner, pant diaper or like article. The polyethene produced from renewable raw materials is also used for packaging material components. The packaging components concerned are, for instance, film or some other part of a packaging unit. Fig. 1 is a sectioned view of an absorbent article, which may be a diaper or a sanitary napkin, and Fig. 2 illustrates by way of example an absorbent article in the form of a diaper. The absorbent article in Fig. 1 includes a bottom liquid-impermeable barrier sheet 1, which in this document is referred to as a liquid-impermeable backing sheet 1, an absorbent layer 2, and a top liquid-permeable outer sheet or surface sheet 3 which is intended to lie proximal to the wearer in use.

Fig. 2 illustrates a diaper 4 that includes a top liquid-permeable sheet 5, an absorbent sheet or unit 6, and a bottom liquid-impermeable backing sheet 7, said sheets being delimited by two transverse edges 8, 9 and two longitudinal edges 10, 11. The diaper also includes longitudinally

extending leg elastic 12, 13 and possibly a liquid barrier 14, 15 on each side of the longitudinal centre line. The diaper also includes fastening devices in the form of fastener tapes 16, 17 and waist elastic 18, 23. The polyethene is used as component material in the liquid-impermeable backing sheet, waist elastic, top sheet, and fastener tape. Even other components may conceivably be produced from material that contains polyethene. The liquid-impermeable backing sheet 1, 7 is the sheet that prevents liquid leaking from the article. In the case of sanitary napkins and panty liners, the top sheet 3, 5 may also be produced from polyethene. The outer sheet or top sheet 3, 5 is the sheet that is uppermost and lies proximal to the wearer in use. This sheet shall be permeable to liquid, so that discharged liquid can be quickly drawn by suction down into the underlying absorbent sheet 2, 6. Diapers also include waist elastic 18, 23 and fastener devices 16, 17 in the form of tape. The waist elastic 18, 23 is positioned on the diaper in waist-height to make the diaper flexible and comfortable for the wearer in use and the fastener devices 16, 17 in the form of adhesive tape or in the form of touch-and-close fasteners by means of which the diaper can be secured in use so as not to loosen from the wearer.

By way of example of an absorbent article, Fig. 3 shows a folded sanitary napkin 19 enclosed in a packaging unit 20 comprised of film that includes polyethene produced from renewable raw material and Fig. 4 shows several sanitary napkins 21 wrapped in respective packaging material 21 which comprises film that contains polyethene produced from renewable raw material, said individual packets being enclosed in a packaging unit 22 comprising film material that includes polyethene produced from renewable raw material. The absorbent articles in the packages may include components comprised of material that includes polyethene produced from renewable raw material, although absorbent articles that

include components made of completely different materials may also be included. In the packaging method illustrated in Fig. 4, one of the packages (21, 22) may consist of film material that includes polyethene produced from renewable raw material; while the other packages may consist of a completely different material.

The invention thus relates to the use of a material that contains polyethene produced from renewable raw material as a component of an absorbent article, such as a diaper, sanitary napkin, incontinence protector, panty liner, pant diaper or the like.

The material used may comprise up to 100% polyethene that has been produced from renewable raw material. Alternatively, the polyethene may be mixed with other materials, such as starch, for facilitating degradation of the material, for instance. Many different materials can be used together with the polyethene. Examples include other renewable materials, non-renewable materials or fillers. When the material used contains polyethene produced from renewable raw material and also contains some other material, the polyethene may be present in an amount corresponding to about 50 to 99% and the remainder consisting of some other material. The percentile proportion of said other material will depend on the nature of the material and the reason why it has been mixed with the polyethene. In respect to relatively large percentages of polyethene, the polyethene may be present in quantities corresponding to 60-80%. At times, only a small percentage of this other material will be used, e.g. percentages of 5% or from 1 to 20%, for instance, in which case the polyethene produced from renewable raw material will be 95% or from 80 to 99%. A feasible material mixture is one in which there is used polyethene produced from renewable raw material and polyethene produced from a petroleum product. The proportion of polyethene produced from renewable raw material will vary

from 1 to 99%. Thus, the percentage of polyethene produced from renewable raw material will depend on the purpose and on the material mixed therewith. The material described above is also included in a following Claim as a mixture. When the polyethene produced from renewable raw material is mixed with some other material, this is also referred to as a mixture. The material composition described here also applies to the material used as packaging in accordance with the invention.

The components used in the absorbent articles are produced in accordance with known technology. Film can be produced and used in the manufacture of liquid-impermeable backing sheets which are then included in the diaper manufacturing process, this process also being carried out in accordance with conventional methods. Film can also be used as tape for the fastener devices. Top sheets and waist elastic are also produced in a conventional manner and included in the conventional manufacture of absorbent articles. For instance, top sheets may be made of film and then perforated. Surface material can also be produced in the form of nonwoven, by carding fibres that are then bonded in ovens. However, this is a question of bicomponent fibres of polyethene/polypropene. In the case of metallocene catalysts, elastic polyethene material can be produced for use, e.g., in waist elastic subsequent to having produced film from said material. As before mentioned, the components may be, e.g., backing sheets, i.e. liquid-impermeable sheets, found in all types of absorbent articles, top sheets found in, e.g., sanitary napkins and panty liners, waist elastic in diapers and fastener devices found primarily in diapers. The components recited in the depending Claims will thus be contingent on the type of article concerned in each respective case.

The invention also relates to a method for producing an absorbent article such as a diaper, sanitary napkin,

incontinence protector, panty liner, pant diaper or the like, in which ethene is produced from renewable raw material, preferably ethanol, and polymerised to polyethene, wherein a film containing polyethene is obtained, by forming at least one article component from said film, and by feeding the component into a machine together with an absorbent body or pad and possibly remaining sheets, and joining the components together to form an absorbent article.

10 An absorbent article will normally include a bottom liquid-impermeable barrier sheet, an absorbent sheet on top of said liquid-impermeable backing sheet, a top liquid-permeable outer sheet which is intended to lie proximal to the wearer in use, waist elastic and fastener devices.

15 A life-cycle analysis (LCA) comprises the stages included in the aforesaid method and also in the use of the absorbent article and the recovery of the used article. In the article recovery process, the article is broken down or incinerated. Carbon dioxide generated during combustion or degradation and in the production of ethanol is consumed in corresponding quantities in the new formation of raw materials, such as potatoes, seed and trees, for instance.

25 Ethanol is produced from a plant in a conventional manner and ethene is produced from the ethanol as described above. The ethene is then polymerised to polyethene, which has also been described above. The components to be included in the absorbent article are then produced. The component produced may be film for use in producing the liquid-impermeable backing sheet of an article. Film may be produced by a film blowing process, a moulding process, or by cold roll extrusion. The film is then introduced into the article manufacturing process in a conventional manner in which the film is applied to the article, for instance in a diaper manufacturing machine. Alternatively, the component can be



produced in some other way, for instance as components for use as top sheets described above. Subsequent to its manufacture, the component is introduced into the article production line.

5

The invention also relates to an absorbent article component, said component being, for instance, a liquid-impermeable backing sheet 1, 7, a top sheet 3, 5, fastener means 16, 17, or waist elastic 18, 23 comprised of a material which includes polyethene, where at least a part of the polyethene is produced from renewable raw material, preferably ethene produced from ethanol.

The invention also relates to an absorbent article, such as a diaper, sanitary napkin, incontinence guard, panty liner, pant diaper or the like, where at least one component is comprised of a material that contains polyethene that has been produced from a renewable raw material, preferably ethene produced from ethanol.

20

The articles will normally include a bottom liquid-impermeable backing sheet 1, 7, an absorbent sheet or absorbent unit 2, 6 which lies on said sheet, a top or upper liquid-permeable outer sheet 3, 5, fastener means 16, 17 and waist elastic 18, 23.

25

These absorbent articles 4, 19, 21 can be packed individually, as at 19, or as indicated at 20, 22, several articles 21 may be packed and packaged in polyethene film produced from renewable raw material, preferably ethene produced from ethanol. When the absorbent articles 19, 21 are packaged in a larger, multi-pack unit 22, they may already be enclosed in individual packets 19 or may lack such packeting. Prepacking and the manufacture of the prepack or package are effected in accordance with known methods.

35

The invention also relates to absorbent articles which are packaged individually as at 19 or where several articles 21 are enclosed in a packaging unit 20, 22 comprised of film that contains polyethene produced from renewable raw material, preferably ethene produced from ethanol.

Finally, the invention also relates to a packaging unit 20, 22 which includes film that is comprised of material which includes polyethene produced from renewable raw material, preferably ethene produced from ethanol. In this case, as in all other embodiments of the invention, the material may consist entirely of polyethene produced from renewable raw material, or may comprise material that includes 50-99% polyethene. The examples of material and percentages mentioned above also apply to the packaging material.

The package is produced in accordance with conventional methods. For instance, film can be produced from the material that includes polyethene and a package then produced. As before mentioned, the packaging material component need not consist solely of film, but may also include some other component.

The packaging material including polyethene film produced from renewable raw material can be used in any selected type of packaging, preferably packaging of an absorbent product, such as a diaper, a sanitary napkin, an incontinence protector, a panty liner, pant diaper or the like. However, the packaging may also concern paper wipes, for instance kitchen paper, toilet paper, cloth wipes and the like. Thus, the packaged product need not always consist of a product that includes a component containing polyethene produced from renewable raw material. Neither need the packaged article be an absorbent product.

The invention also relates to the use of a material that contains polyethene produced from renewable raw material to package different products.

5 One advantage afforded by the invention is that it is environmentally friendly by virtue of including components that are produced from material which contains polyethene and which, in turn, is produced from renewable raw material. This raw material does not deplete the petroleum sources of a  
10 community. Another advantage afforded by the use of renewable raw materials is that plants consume carbon dioxide as they develop, meaning that the greenhouse effect will not increase when using renewable raw materials instead of petroleum raw materials when said products are incinerated after use. This  
15 advantage also applies if the product is not incinerated, since the plant has already absorbed CO<sub>2</sub> and therewith contributed to a reduction in the greenhouse effect.

## CLAIMS

1. The use of a material that includes polyethene produced from renewable raw material as a component of an absorbent article, such as a diaper, sanitary napkin, incontinence protector, panty liner, pant diaper or the like.

2. The use according to Claim 1, characterised in that the material consists of 100% of said polyethene.

3. The use according to Claim 1, characterised in that the material comprises from 50 to 99% of said polyethene.

4. The use according to Claim 1, characterised in that the component is a liquid impermeable backing sheet.

5. The use according to Claim 1, characterised in that the component is an outer sheet or top sheet.

6. The use according to Claim 1, characterised in that the component is a waist elastic.

7. The use according to Claim 1, characterised in that the component is a fastener device.

8. An absorbent article such as a diaper, sanitary napkin, incontinence protector, panty liner, pant diaper or the like, wherein at least one component of said article is comprised of material that contains polyethene, characterised in that said polyethene has been produced from renewable raw material, preferably from ethene produced from ethanol.

9. An absorbent article according to Claim 8, characterised in that the material consists in 100% of said polyethene.

10. An absorbent article according to Claim 8, **characterised** in that the material comprises from 50 to 99% of said polyethene.

5 11. An absorbent article according to Claim 8, **characterised** in that said component is a liquid-impermeable backing sheet.

12. An absorbent article according to Claim 8, **characterised** in that the component is an outer sheet or top sheet.

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13. An absorbent article according to Claim 8, **characterised** in that the component is a waist elastic.

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14. An absorbent article according to Claim 8, **characterised** in that the component is a fastener device.

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15. An absorbent article according to any one of Claims 8-14, **characterised** in that said article is packaged either alone (19) or together with several (21) articles in a packaging unit (20, 22) comprising film that includes polyethene produced from renewable raw material, preferably ethene produced from ethanol.

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16. A method of producing an absorbent article such as a diaper, a sanitary napkin, an incontinence protector, a panty liner, pant diaper or the like, **characterised** by producing ethene from renewable raw material, preferably ethanol, polymerising the ethene to polyethene, producing film containing said polyethene; forming at least one article component from said film, feeding said component into a machine together with an absorbent body and possibly other sheets, and joining said component to the absorbent article.

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17. A method according to Claim 16, **characterised** by forming the film solely from said polyethene.

18. A method according to Claim 16, **characterised** by forming the film from a mixture that includes from 50 to 99% of said polyethene.

5 19. A method according to Claim 16, **characterised** by forming a liquid-impermeable backing sheet from said film.

20. A method according to Claim 16, **characterised** by forming an outer sheet or top sheet from said film.

10

21. A method according to Claim 16, **characterised** by forming waist elastic from said film.

15

22. A method according to Claim 16, **characterised** by forming a fastener device from said film.

20

23. A component of an absorbent article, for instance a component in the form of a liquid-impermeable backing sheet (1, 7), an outer sheet or top sheet (3, 5), a fastener device (16, 17) or waist elastic (18, 23) from a material that includes polyethene, **characterised** in that at least part of the polyethene has been produced from renewable raw material, preferably ethene produced from ethanol.

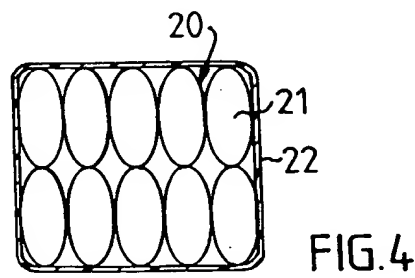
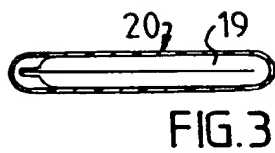
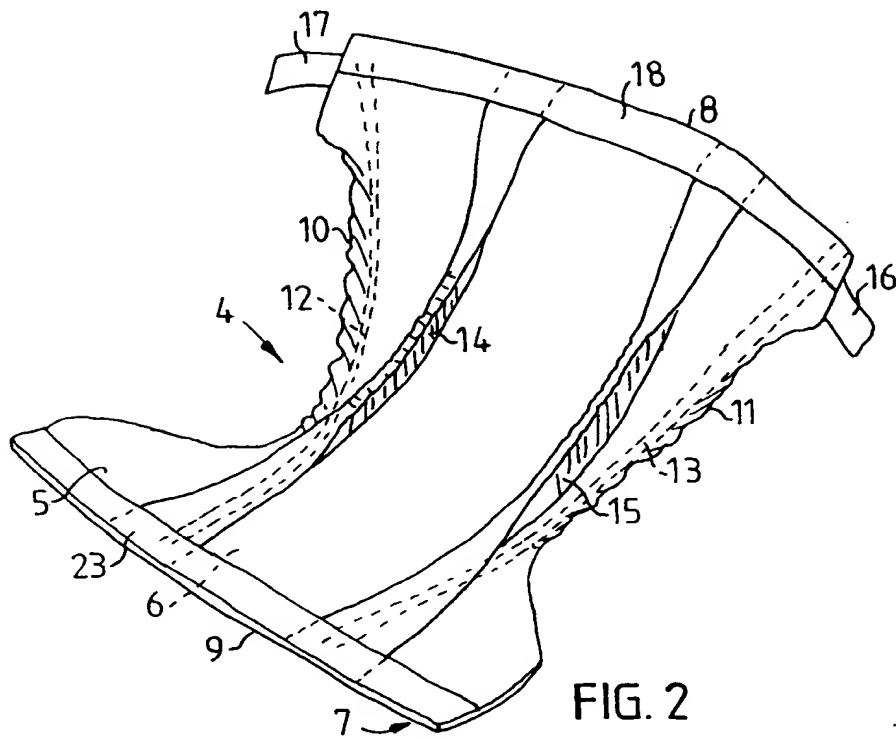
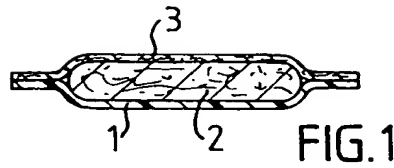
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24. Packaging material (20, 22) that includes film material, **characterised** in that the film is comprised of material that contains polyethene produced from renewable raw material, preferably ethene produced from ethanol.

30

25. Packaging material according to Claim 24, **characterised** in that the material consists in 100% of said polyethene.

26. Packaging material according to Claim 25, **characterised** in that said material comprises 50 to 99% of said polyethene.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/01205

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61F 13/15, A61L 15/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61F, A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0747065 A1 (FIBERWEB FRANCE SA), 11 December 1996 (11.12.96)  --	1-26
A	GB 587378 A (EDWARD HUNTER ET AL), 23 April 1947 (23.04.47)  -- -----	1-26

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

4 October 1999

Date of mailing of the international search report

01-12-1999

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Jack Hedlund/Elis

Telephone No. +46 8 782 25 00



**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

30/08/99

International application No.  
PCT/SE 99/01205

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
EP	0747065	A1	11/12/96	CA	2175014	A	27/10/96
				FR	2733520	A,B	31/10/96
				US	5783504	A	21/07/98
-----							
GB	587378	A	23/04/47	NL	63902	C	00/00/00
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**REPLACED BY**  
**2000-01-01**

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>51351-55813</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/SE99/01205</b>	International filing date (day/month/year) <b>02/07/1999</b>	Priority date (day/month/year) <b>02/07/1998</b>
International Patent Classification (IPC) or national classification and IPC <b>A61F13/15</b>		
Applicant <b>SCA HYGIENE PRODUCTS AB et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand <b>15/01/2000</b>	Date of completion of this report <b>28.08.2000</b>
Name and mailing address of the international preliminary examining authority:  <b>European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4485</b>	Authorized officer <b>Fachin, F</b> Telephone No. <b>+49 89 2399 2057</b> 

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**International application No. **PCT/SE99/01205****1. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

**Description, pages:**

1-16 as published

**Claims, No.:**

1-26 as received on 10/07/2000 with letter of 03/07/2000

**Drawings, sheets:**

1/1 as published

**2. The amendments have resulted in the cancellation of:**

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

**4. Additional observations, if necessary:**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/SE99/01205

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Yes:	Claims	1-7,9-22,25,26
	No:	Claims	8,23,24
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-26
Industrial applicability (IA)	Yes:	Claims	1-26
	No:	Claims	

**2. Citations and explanations**

see separate sheet

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

- see separate sheet

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/SE99/01205

**SECTION V**

1. The application relates substantially to the use of a material that includes **polyethene produced from renewable raw materials** as a component of an absorbent article or as a packaging material.

The purpose with the invention is to achieve an **environmentally friendly** absorbent article or packaging material.

According to the description of the present application (see page 7, lines 10 to 28) it is known from the state of the art to produce polyethene from renewable ethene and to produce ethene from renewable ethanol, i.e. ethanol produced from a reproducible plant.

According to the description of the present application (see page 3, lines 12 to 15), it is also known the use of a **renewable material**, for example polylactide, in absorbent articles. This means that the idea of using renewable materials in absorbent articles which so become environmentally friendly is "per se" not new.

Since the use of a material including polyethene produced from renewable raw material (said polyethene being "per se" known) in an absorbent article wherein the use of "normal" (produced from non-renewable sources) polyethene is also known (see description page 4, lines 15 to 23), does not seem to provide for any other advantage than that of obtaining an environmentally friendly article, the subject-matter of claim 1 is considered not to fulfil the criterion set forth in Article 33(3) PCT (lack of inventive step).

The problem of producing environmentally friendly articles is indeed a well known problem in any field, the use of materials produced from renewable sources is already known in the specific field of absorbent articles: therefore the choice of a material including polyethene (material which is already used in such articles) from renewable raw material is considered to be simply a design option.

2. For the reasons set out in point 1 above also the subject-matter of independent claim 8 does not fulfil at least the criterion set forth in Article 33(3) PCT (lack of inventive step).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/SE99/01205

Since the absorbent article of claim 8 has no differentiating technical features with respect to a corresponding article including "non-renewable" polyethene, its subject-matter could also be considered as not fulfilling the criterion set forth in Article 33(2) PCT (lack of novelty).

3. The method claim 16 does not contain any method step which is not known in the state of the art and it further discloses simply the use of ethene from renewable raw materials for producing films containing polyethene.

Taking into consideration the arguments of point 1 above, also the subject-matter of claim 16 is considered not to fulfil the criterion set forth in Article 33(3) PCT (lack of inventive step).

4. Independent claim 23 refers to a component of an absorbent article wherein at least part of the polyethene has been produced from renewable raw material. Again the arguments of point 1 above can be used for concluding that the subject-matter of claim 23 does not fulfil at least the criterion set forth in Article 33(3) PCT (lack of inventive step).

Since the component of claim 23 has no differentiating technical features with respect to corresponding components including "non-renewable" polyethene, its subject-matter could also be considered as not fulfilling the criterion set forth in Article 33(2) PCT (lack of novelty).

5. Packagings made of "normal polyethene" are per se known (see the description of the present application, page 4, lines 25 to 32) and therefore, account being taken for the arguments of point 1 above, also the subject-matter of independent claim 24 is considered not to fulfil at least the criterion set forth in Article 33(3) PCT (lack of inventive step).

Since the packagings of claim 23 have no differentiating technical features with respect to corresponding packagings including "non-renewable" polyethene, its subject-matter could also be considered as not fulfilling the criterion set forth in Article 33(2) PCT (lack of novelty).

6. The dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. **PCT/SE99/01205**

of inventive step (Article 33(3) PCT), because their additional features are considered to be only matter of normal design procedure.

**SECTION VII:**

7. The requirements of Rule 5.1(a)(ii) PCT are not met because the document representing the closest state of the art is not identified as such in the description and the relevant background art disclosed therein is not briefly discussed.
8. The requirements of Rule 6.3(b) PCT are not met because the independent claims are not drafted in the two-part form.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/01205

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61F 13/15, A61L 15/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61F, A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0747065 A1 (FIBERWEB FRANCE SA), 11 December 1996 (11.12.96)	1-26
	--	
A	GB 587378 A (EDWARD HUNTER ET AL), 23 April 1947 (23.04.47)	1-26
	--	
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☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another claim or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*Z\* document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

4 October 1999

01-12-1999

Name and mailing address of the ISA/  
Swedish Patent Office

Authorized officer



**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

30/08/99

International application No.

PCT/SE 99/01205

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0747065 A1	11/12/96	CA 2175014 A	27/10/96
		FR 2733520 A,B	31/10/96
		US 5783504 A	21/07/98
GB 587378 A	23/04/47	NL 63902 C	00/00/00

# PCT REQUEST

The undersigned request that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only	
PCT/ SE 99 / 01205	
International Application No.	
02-07-1999	
International Filing Date	
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> The Swedish Patent Office PCT International Application </div>	
Name of receiving Office and "PCT International Application"	
Applicant's or agent's file reference 51351-55813 (if desired) (12 characters maximum)	

<b>Box No. I TITLE OF INVENTION</b>	
Use of a polyethene material as a component of an absorbent article, the absorbent article, a method of producing an absorbent article and an absorbent article component	
<b>Box No. II APPLICANT</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)	
SCA Hygiene Products AB SE-405 03 Göteborg, Sweden	
<input type="checkbox"/> This person is also inventor. Telephone No. Facsimile No. Teleprinter No.	
State (that is, country) of nationality: SE	State (that is, country) of residence: SE
This person is the applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<b>Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)</b>	
Name and address: Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)	
Elisabeth Lakso Tallvivelvägen 21 SE-444 46 Stenungsund, Sweden	
This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)	
State (that is, country) of nationality: SE	State (that is, country) of residence: SE
This person is the applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
<b>Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE</b>	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
BERG S A; FAGERLIN H; HAMMAR E; LETTSTRÖM R; KIERKEGAARD, L-O; LAGMAN, S; AXELL, K; LARSSON, K ALBIHNS PATENTBYRÅ STOCKHOLM AB, P.O. Box 5581, SE-114 85 STOCKHOLM, Sweden	
Telephone No. +46 8 59 88 72 00 Facsimile No. +46 8 59 88 73 00 Teleprinter No. 11942 ALBIHNS S	
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

02-07-1999

## Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

*If none of the following sub-boxes is used, this sheet is not to be included in the request*

20/56

Name and address: Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

/Eva Simmons/  
Brobergsgatan 7  
SE-431 66 Mölndal, Sweden

This person is:

- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality: SE

State (i.e. country) of residence: SE

This person is the applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

-//-

Name and address: Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

/Hannele Nurmi/  
Kroge Krapp 6  
SE-471 42 Rönäng, Sweden

This person is:

- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality: SE

State (i.e. country) of residence: SE

This person is the applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

-//-

Name and address: Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

/Anna Karin Jönbrink/  
Ryd Västergårdsväg 65 B  
SE-443 51 Lerum, Sweden

This person is:

- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality: SE

State (i.e. country) of residence: SE

This person is the applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

-//-

Name and address: Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

/Anders Silfverstrand/  
Rådstocksvägen 2 A  
SE-435 44 Mölnlycke, Sweden

This person is:

- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality: SE

State (i.e. country) of residence: SE

This person is the applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting state of the Harare Protocol and of the PCT **SL**
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line).....

**National Patent (if other kind of protection or treatment desired, specify on dotted line):**


- |   |  |
|---|--|
| <input checked="" type="checkbox"/> AL Albania .....                              | <input checked="" type="checkbox"/> LS Lesotho.....                                    |
| <input checked="" type="checkbox"/> AM Armenia .....                              | <input checked="" type="checkbox"/> LT Lithuania .....                                 |
| <input checked="" type="checkbox"/> AT Austria .....                              | <input checked="" type="checkbox"/> LU Luxembourg .....                                |
| <input checked="" type="checkbox"/> AU Australia .....                            | <input checked="" type="checkbox"/> LV Latvia .....                                    |
| <input checked="" type="checkbox"/> AZ Azerbaijan .....                           | <input checked="" type="checkbox"/> MD Republic of Moldova.....                        |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina .....               | <input checked="" type="checkbox"/> MG Madagascar.....                                 |
| <input checked="" type="checkbox"/> BB Barbados .....                             | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia ..... |
| <input checked="" type="checkbox"/> BG Bulgaria .....                             | <input checked="" type="checkbox"/> MN Mongolia .....                                  |
| <input checked="" type="checkbox"/> BR Brazil.....                                | <input checked="" type="checkbox"/> MW Malawi .....                                    |
| <input checked="" type="checkbox"/> BY Belarus.....                               | <input checked="" type="checkbox"/> MX Mexico .....                                    |
| <input checked="" type="checkbox"/> CA Canada .....                               | <input checked="" type="checkbox"/> NO Norway .....                                    |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein ..... | <input checked="" type="checkbox"/> NZ New Zealand.....                                |
| <input checked="" type="checkbox"/> CN China .....                                | <input checked="" type="checkbox"/> PL Poland .....                                    |
| <input checked="" type="checkbox"/> CU Cuba .....                                 | <input checked="" type="checkbox"/> PT Portugal.....                                   |
| <input checked="" type="checkbox"/> CZ Czech Republic .....                       | <input checked="" type="checkbox"/> RO Romania .....                                   |
| <input checked="" type="checkbox"/> DE Germany .....                              | <input checked="" type="checkbox"/> RU Russian Federation .....                        |
| <input checked="" type="checkbox"/> DK Denmark .....                              | <input checked="" type="checkbox"/> SD Sudan .....                                     |
| <input checked="" type="checkbox"/> EE Estonia.....                               | <input checked="" type="checkbox"/> SE Sweden .....                                    |
| <input checked="" type="checkbox"/> ES Spain.....                                 | <input checked="" type="checkbox"/> SG Singapore .....                                 |
| <input checked="" type="checkbox"/> FI Finland.....                               | <input checked="" type="checkbox"/> SI Slovenia.....                                   |
| <input checked="" type="checkbox"/> GB United Kingdom .....                       | <input checked="" type="checkbox"/> SK Slovakia.....                                   |
| <input checked="" type="checkbox"/> GD Grenada .....                              | <input checked="" type="checkbox"/> SL Sierra Leone .....                              |
| <input checked="" type="checkbox"/> GE Georgia .....                              | <input checked="" type="checkbox"/> TJ Tajikistan.....                                 |
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| <input checked="" type="checkbox"/> GM Gambia .....                               | <input checked="" type="checkbox"/> TR Turkey.....                                     |
| <input checked="" type="checkbox"/> HR Croatia .....                              | <input checked="" type="checkbox"/> TT Trinidad and Tobago .....                       |
| <input checked="" type="checkbox"/> HU Hungary .....                              | <input checked="" type="checkbox"/> UA Ukraine.....                                    |
| <input checked="" type="checkbox"/> ID Indonesia .....                            | <input checked="" type="checkbox"/> UG Uganda .....                                    |
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| <input checked="" type="checkbox"/> IN India .....                                | <input checked="" type="checkbox"/> UZ Uzbekistan.....                                 |
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| <input checked="" type="checkbox"/> KR Republic of Korea .....                    |  |
| <input checked="" type="checkbox"/> KZ Kazakstan .....                            |  |
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| <input checked="" type="checkbox"/> LK Sri Lanka .....                            |  |
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**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

02-07-1999

<b>Box No. VI PRIORITY CLAIM</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		National application: Country:	regional application:* regional Office	international application: receiving Office
item (1) 2 July 1998	9802370-8	Sweden		
item (2)				
item (3)				
<input checked="" type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): <u>1</u>				
<p>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See supplemental Box.</p>				
<b>Box No. VII INTERNATIONAL SEARCHING AUTHORITY</b>				
<b>Choice of International Searching Authority (ISA)</b> (If two or more international Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA /SE		<b>Request to use results of earlier search; reference to that search</b> (if an earlier search has been carried out by or requested from the International Searching Authority): Date (day/month/year):      Number      Country (or regional Office) 2 July 1998                      SE 98/00695    SE		
<b>Box No. VIII CHECK LIST; LANGUAGE OF FILING</b>				
This international application contains the following number of sheets: request: 4 ✓ description (excluding sequence listing part): 13 ✓ claims: 3 ✓ abstract: 1 ✓ drawings: 1 ✓ sequence listing part of description: _____ <b>Total number of sheets: 22 ✓</b>		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney (will be filed later) 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): ITS SE 98/00695		
<b>Figure of the drawings</b> which should accompany the abstract:		<b>Language of filing of the</b> international application: Swedish		
<b>Box No. IX SIGNATURE OR APPLICANT OR AGENT</b>				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).				
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">             Kristina Axell         </div> <div style="text-align: center;">           2 July 1999         </div> </div>				

1. Date of actual receipt of the purported international application: <u>02-07-1999</u>		2. Drawings: <input checked="" type="checkbox"/> received: <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT-Article 11(2):		
5. International Searching Authority (if two or more are competent): <u>ISA/SE</u>		
6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid		
Date of receipt of the record copy by the International Bureau: <u>09 AUGUST 1999</u>		

02-07-1999

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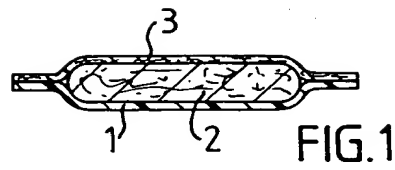


FIG. 1

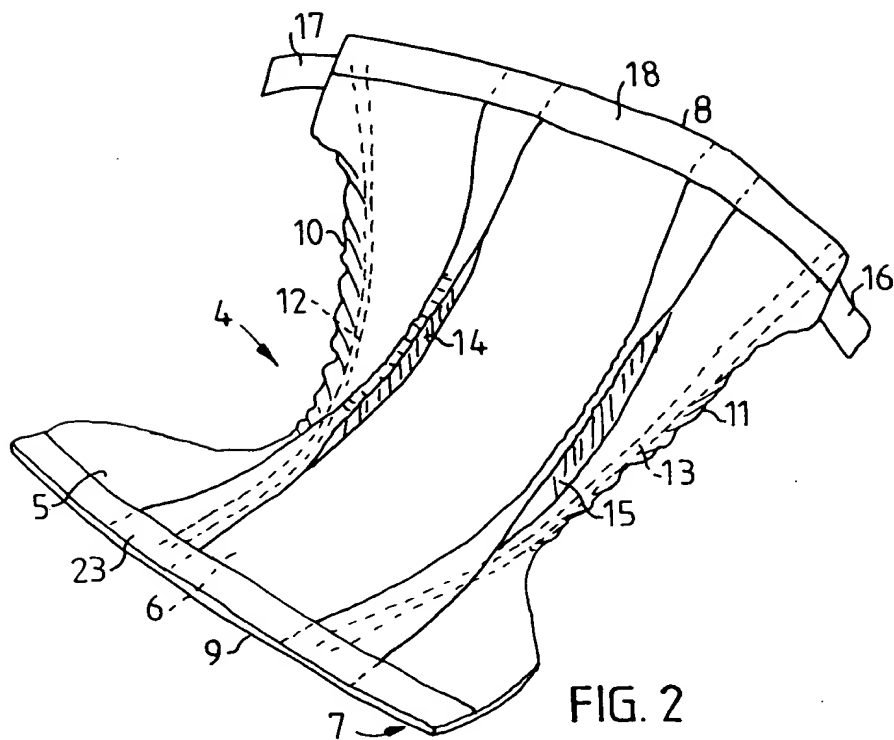


FIG. 2

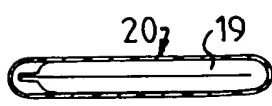


FIG. 3

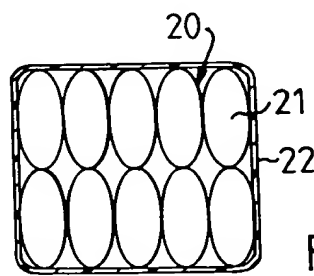


FIG. 4

Användning av polyetenmaterial som komponent i ett absorberande alster, det absorberande alstret, förfarande för framställning av det absorberande alstret samt komponent i absorberande alster.

5 Uppfinningen avser användning av ett material innehållande polyeten framställd från förnybar råvara som komponent i ett absorberande alster, absorberande alster, förfarande för framställning av ett absorberande alster, komponent i absorberande alster samt förpackning av ett material innehållande polyeten framställd från förnybar råvara.

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I dagens samhälle är det mycket aktuellt att tänka på miljön. Man samlar in tidningspapper, förpackningar av glas, metall, papper, plast mm för återvinning med syfte att spara på samhällets tillgångar såsom olja, skog och metaller. Vid framställning av produkter är det önskvärt att använda så miljövänliga material som är möjligt och rimligt. Detta är också mycket viktigt vid framställning av sanitetsprodukter för engångsanvändning, såsom exempelvis blöjor, bindor, inkontinens-skydd, trosskydd etc samt vid framställning av förpackningar. Förutom att spara på våra resurser måste vi också tänka på miljön vad gäller sopor och föroreningar. Sopor hamnar på soptippar där de förvaras och på lång sikt bryts ned eller också förbrännes. Då vi använder engångsartiklar och engångsförpackningar leder det till att de hamnar på soptippen som växer eller de förbränns och ger föroreningar samt CO<sub>2</sub>-bildning. Detta bidrar till den oönskade växthuseffekten samt en förbrukning av naturens tillgångar.

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En del av samhällets resurser är baserade på växter som kontinuerligt nybildas. Andra resurser finns i begränsad mängd och återbildas mycket långsamt, som t ex petroleumprodukter. Genom att använda petroleumråvaror tär vi på samhällets tillgångar. Det har tagit många år för den olja som vi idag använder att bildas.

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Ändamålet med uppfinningen är att bidra till att lindra dessa problem och att skapa en mer miljövänlig absorberande engångsprodukt och en mer miljövänlig förpackning.

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Detta uppnås enligt uppfinningen genom användning av ett material innehållande polyeten framställd från förnybar råvara. Med förnybar avses här en råvara som framställs från växtbaserat material. Man tillverkar den förnybara råvaran från en växt och växter går att förnya genom att exempelvis plantera nya träd, sätta ny potatis, så ny säd etc. Motsatsen till en vara framställd från en förnybar råvara är varor som förbrukar råvaror som ej går att förnya, t ex polyeten framställd av petroleumråvaror. I TNC:s Energiordlista definieras en förnybar energikälla som en energikälla som kan reproduceras i samma takt som den utnyttjas. Som förnybara energikällor räknas t ex skogsenergi, energiskog och energigrödor. Här används samma betydelse på begreppet förnybar, även om det inte är en energikälla utan en råvara som avses.

Det finns idag några exempel på vad somliga menar är miljövänliga absorberande alster. Ett exempel är flergångsprodukter som kan användas flera gånger genom att de tvättas mellan användningarna. Tygblöjor används på detta sätt. I US, A, 5 032 119 visas en återanvändbar tygblöja. Miljövänliga engångsprodukter kan vara produkter som innefattar komponenter framställda från nedbrytbara material såsom polykaprolakton, polylaktid eller latexmaterial. I WO, A1, 9407941 beskrivs en film framställd av polylaktid, som är bionedbrytbar och komposterbar, och som kan användas i t ex blöjor. Ett annat nedbrytbart material som också kan användas i filmer är sampolymerer innehållande polykaprolakton och polylaktidblock, vilket beskrivs i WO, A1, 9529200. Denna film kan användas i t ex blöjor. Bionedbrytbara latexmaterial används som filmer i blöjor, vilket beskrivs i EP, A1, 454 104. Exempel på förnybara material som används i absorberande alster är polylaktid. Man använder även stärkelse som är förnybar, i kombination med polykaprolakton.

Uppfinningen avser användning av ett material innehållande polyeten framställd från förnybar råvara som komponent i ett absorberande alster, såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande.



Enligt uppfinningen avses även ett absorberande alster såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande och där minst en komponent är av ett material innehållande polyeten framställd från förnybar råvara.

Vidare avser uppfinningen ett absorberande alster som ensamt eller tillsammans med flera alster är inneslutet i en förpackning av en film innehållande polyeten framställd från förnybar råvara.

Dessutom avser uppfinningen ett förfarande för framställning av ett absorberande alster såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande.

Uppfinningen avser även en komponent i absorberande alster, varvid komponenten är t ex ett spärrskikt, ytskikt, fastsättningsanordning eller midjeelastik av ett material innehållande polyeten framställd från förnybar råvara.

Slutligen avser uppfinningen också en förpackning innefattande en film, där filmen är av ett material innehållande polyeten framställd från förnybar råvara.

Komponenterna i de absorberande alster som avses är alla komponenter som kan framställas av polyeten, samt även andra tänkbara komponenter som skulle kunna tillverkas av polyeten. Exempel på komponenter vilka framställs av polyeten är ett plastskikt som fungerar som spärrskikt på absorberande alster, midjeelastik i t ex blöjor, ytskikt på t ex bindor och trosskydd och tape som används som fastsättningsanordning i blöjor.

En del av en förpackning kan vara en film av ett material innehållande polyeten. Om förpackningen består av flera delar behöver inte alla dessa bestå av detta material, utan kan bestå av exempelvis annan plastfilm eller annat lämpligt material. Delen kan även vara av annan form än film i förpackningar som kan tänkas framställas av polyeten.

Polyeten framställs idag genom polymerisation av eten som erhålls genom termisk (ånga) och katalytisk krackning av olika kolväten, allt från etan erhållen ur naturgas till råolja.

Nedan beskrivs nu hur polyeten kan framställas, vilket exempelvis behandlas i Textbook of Polymer Science, Third Edition, Fred W. Billmeyer, JR, A Wiley-Interscienc Publication John Wiley & Sons.

Etenpolymerisation kan utföras med bensen eller klorobensen som lösningsmedel. Vid de temperaturer och tryck, som används, löses både polymer och monomer i dessa föreningar så att reaktionerna är rena lösningspolymerisationer. Vatten eller andra vätskor kan tillsättas för att avleda reaktionsvärme.

Vid kontinuerlig process används tubformiga reaktorer, vilka kan ha diametrar av mindre än 2,5 cm och längder upp till 30 m. Det rostfria stålroret fylls med vatten, och eten innehållande initiator och möjligen bensen introduceras. Ytterligare initiator och vatten eller bensen kan injiceras vid en eller flera punkter längs röret för att hålla initiatorkoncentrationen nära konstant genom reaktorn. Tio eller flera procent av eten polymeras vid den borte änden av reaktorn. Här tas gas- och vätskefaserna bort kontinuerligt, polymeren separeras och återstående eten återcirkuleras efter rening.

En annan process använder bulkpolymerisation i en torntypsreaktor. Eten innehållande spårmängder av syre laddas till reaktorn vid 1500 atm och 190 °C.

Reaktionen hålls väsentligen isotermisk och utförs till 10-15 % omsättning. Utloppet från reaktorn passerar till ett separatkärl i vilket ej omvandlad eten tas bort för återcirkulering. Den smälta polyeten kylv under dess kristallina smältpunkt och förs genom de vanliga avslutande stegen.

På ovan beskrivna sätt kan LDPE (lågdensitetspolyeten) framställas vilket är den polyeten som främst används till polyetenfilmer.

HDPE (högdensitetspolyeten), som också går att använda till filmer, kan framställas på flera sätt, inkluderande radikalpolymerisation av eten vid extremt höga tryck, koordinationspolymerisation av eten och polymerisation av eten uppburna av metalloxidkatalysatorer.

I koordinationspolymerisation av eten används en katalysator framställd som en kolloidal dispersion genom att alkylaluminium och  $\text{TiCl}_4$  bringas att reagera i ett lösningsmedel såsom heptan. Eten tillsätts till reaktionskärlet under svagt tryck, vid en temperatur på 50-75 °C. Polymerisationsvärme tas bort genom kylning. Polymeren bildas som pulver eller granuler, olösliga i reaktionsblandningen. Vid reaktionens avslutning förstörs katalysatorn genom insläpp av vatten eller alkohol, och polymeren filtreras eller centrifugeras av, tvättas och torkas.

Uppbärande metalloxidkatalysatorer kan användas i olika arbetssätt, inkluderande fast bädd, rörlig bädd, fluidiserad bädd och slurryprocess. Eten tillförs med ett paraffin eller cykloparaffin som utdrygningsmedel, vid 60-200 °C och ca 3,5 kPa. Polymeren återvinns genom kylning eller med lösningsmedelavdrivning.

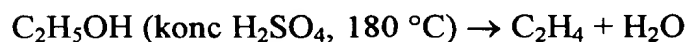
Enligt samma förfarande som används för att framställa HDPE kan polyeten med viss elasticitet framställas. Härvid används metallocenkatalysator och en liten mängd av annan monomer tillsätts, såsom hexen eller buten.

Idag använder man alltså eten från petroleumråvaror, vilka inte är förnybara, och detta tär på naturens tillgångar. Dessutom bildas  $\text{CO}_2$  vid förbränning av polyeten, vilket bidrar till den oönskade växthuseffekten.

Enligt uppfinningen använder man förnybar eten för att framställa en miljövänlig produkt, där eten är framställd från en förnybar råvara som etanol. Etanol är förnybar då den framställs från en växt vilken är reproducerbar. Genom jäsning omvandlas socker till etanol och koldioxid under inverkan av jästsvampar:

$C_6H_{12}O_6 \rightarrow 2 C_2H_5OH + 2 CO_2$ . För jäsning används t ex potatis, säd, skogsråvaror eller andra växter. Varje frukt, bär eller växtdel som innehåller socker kan jäsas.

Eten framställs från den förnybara etanolen genom exempelvis dehydratisering av etanol. Vid upphettning av en alkohol med en stark syra förlorar alkoholen en vattenmolekyl och bildar en alken. Etanol upphettas till 180 °C med koncentrerad svavelsyra:



Från den förnybara etenen kan sedan polyeten framställas på det sätt som redan beskrivits, vilket i sig redan är känt. Det är även känt att framställa eten från etanol, som beskrivet ovan. Det nya är att använda förnybar råvara då polyeten framställs för att användas i absorberande alster, vilket enligt uppfinningen resulterar i miljövänliga absorberande alster. Polyeten används som material i komponenter i alstret, exempelvis som spärrskikt, ytskikt, tape för hopfästning av blöjor eller midjeelastik. Det nya är även att använda förnybar råvara då polyeten framställs för att användas i förpackningar.

Alternativ till eten framställd från förnybar etanol är "krackning" av längre kolkedjor som oljor och fetter till eten. Dvs längre kolkedjor från oljor och fetter bryts ned till mindre molekyler, varav en del är eten. Det är då naturligtvis frågan om vegetabiliska oljor och fetter för att råvaran ska vara förnybar. Många föreningar kan även reageras via etanol till eten, t ex ättiksyra och etylenoxid.

Uppfinningen avser en helt ny användning av material innehållande polyeten framställd av förnybar råvara i absorberande alster och förpackningar. Det är förut

inte känt att i industriell skala använda polyeten framställd från förnybara råvaror för att framställa miljövänliga absorberande alster eller miljövänliga förpackningar, vilka spar på vår miljö och inte tär på petroleumresurserna. En annan fördel med uppfinningen är steget efter användning då engångsprodukten eller förpackningen eventuellt bränns. Vid förbränning av polyeten bildas CO<sub>2</sub>. Denna CO<sub>2</sub> bidrar till den oönskade växthuseffekten. Men då vi använder förnybara råvaror förbrukas CO<sub>2</sub> vid bildning av växterna. Denna positiva effekt erhålles även när produkten eller förpackningen hamnar på soptippen, eftersom även här har CO<sub>2</sub> förbrukats då växterna bildats. Användning av förnybara råvaror gör alltså att växthuseffekten kan mildras.

Uppfinningen beskrives närmare i det följande med hänvisning till bifogade ritning, där

Figur 1 visar ett snitt genom ett absorberande alster, såsom en blöja,

Figur 2 visar en blöja sedd uppfifrån,

Figur 3 visar ett absorberande alster förpackat i polyetenfilm i sidovy, och

Figur 4 visar flera absorberande alster förpackade i polyetenfilm i sidovy.

Polyeten framställd från förnybar råvara används, efter bearbetning, som komponent i ett absorberande alster, såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande. Polyetenen framställd från förnybar råvara används även som komponent i förpackningar. I förpackningar avser komponenten exempelvis en film eller någon annan del av en förpackning. I Fig. 1 visas ett snitt genom ett absorberande alster, som kan vara t ex en blöja eller en binda, och Fig. 2 visar, som exempel på ett absorberande alster, en blöja. Det absorberande alstret på Fig. 1 innefattar ett undre vätskeogenomträngligt skikt 1, vilket i ansökan benämns som

spärrskikt 1, ett absorberande skikt 2 och ett övre vätskegenomträngligt ytskikt 3 avsett att vara vänt mot användaren.

I Fig. 2 visas en blöja 4, som omfattar ett övre vätskegenomträngligt skikt 5, ett absorberande skikt 6 och ett undre vätskegenomträngligt spärrskikt 7, vilka skikt avgränsas av två tvärgående kanter 8, 9 och två längsgående kanter 10, 11. Vidare finns längsgående benelastik 12, 13 och eventuellt på vardera sidan om den längsgående mittlinjen en vätskebarriär 14, 15. Dessutom visas fastsättningsanordningar 16, 17 i form av tape och midjeelastik 18, 23. Polyeten används som material i spärrskikt, midjeelastik, ytskikt, tape. Även andra komponenter kan tänkas framställas av material innehållande polyeten. Spärrskiktet 1, 7 är det skikt som förhindrar vätska att läcka ut ur alstret. På bindor och trosskydd kan man även tillverka ytskiktet 3, 5 av polyeten. Ytskiktet 3, 5 är det skikt som är överst och närmast användaren vid användning. Detta skikt ska vara genomsläppligt för vätska, så att vätskan snabbt sugs ned i det underliggande absorberande skiktet 2, 6. På blöjor finns även midjeelastik 18, 23 och fastsättningsanordningar 16, 17 i form av tape. Midjeelastiken 18, 23 är placerad i midjehöjd på blöjan för att denna ska vara flexibel och bekväm för användaren och fastsättningsanordningarna 16, 17 i form av tape med lim eller kardborre fäster ihop blöjan vid användandet så att den sitter fast och inte lossnar.

I Fig. 3 visas en vikt binda 19, som exempel på ett absorberande alster, innesluten i en förpackning 20 av film av ett material innehållande polyeten framställd från förnybar råvara och i Fig. 4 visas hur flera bindor 21 tillsammans, i sina förpackningar 21, av film av material innehållande polyeten framställd från förnybar råvara, är inneslutna i en förpackning 22 av film av material innehållande polyeten framställd från förnybar råvara. De absorberande alstren i förpackningarna kan innefatta komponenter av material innehållande polyeten framställd från förnybar råvara, men även absorberande alster innefattande komponenter av helt andra material kan avses. I förpackningssättet i Fig. 4 kan en ut av förpackningarna

(21,22) bestå av film av material innehållande polyeten framställd från förnybar råvara, medan den andra förpackningen kan bestå av ett helt annat material.

Uppfinningen avser alltså användning av ett material innehållande polyeten framställd från förnybar råvara som komponent i ett absorberande alster, såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande.

Materialet som används kan till 100 % bestå av polyeten framställd från förnybar råvara. Det är även möjligt att blanda polyeten med andra material, såsom stärkelse, som t ex kan underlätta nedbrytning av materialet. Många olika material går att använda tillsammans med polyeten. Som ytterligare exempel kan nämnas andra förnybara material, icke förnybara material eller fyllmedel. Om materialet innehållande polyeten framställd från förnybar råvara även består av annat material, kan det till ca 50 till 99 % bestå av polyeten och resten är något annat material. Hur stor andelen är av annat material beror på vad det är för material och varför detta inblandas. Lämpliga mängder av polyeten kan vara 60-80 % om det ska vara relativt stor andel polyeten. Ibland rör det sig om endast en liten andel annat material, t ex 5 %, eller 1-20 %, och då består materialet av 95% polyeten eller 80-99% polyeten framställd från förnybar råvara. En tänkbar blandning av material är att man använder en del polyeten framställd från förnybar råvara och en del polyeten framställd från petroleumprodukt. Då kan andelen polyeten framställd från förnybar råvara variera från 1 till 99 %. Andel polyeten framställd från förnybar råvara beror alltså på syftet och vilket material som blandas med polyeten. Det material som ovan beskrivits nämns även i något krav som en blandning. Om polyeten framställd från förnybar råvara blandas med något annat material benämns den alltså även som blandning. Materialsammansättningen som här beskrivits avser även materialet som används i förpackningen enligt uppfinningen.

Komponenterna som används i de absorberande alstren framställs enligt känd teknik. Filmer framställs, vilka kan användas som spärrskikt, vilka sedan införs i blöjframställningen som också sker enligt konventionella metoder. Film används även

som tape för fastsättningsanordningar. Ytskikt och midjeelastik framställs även på vanligt sätt och införs i konventionell framställning av absorberande alster. Ytskikt kan t ex framställas genom att film tillverkas och sedan perforeras. Det går även att framställa ytmaterial i form av nonwoven, genom att ett flor kardas av fibrer som sedan binds i ugn. Då är det emellertid fråga om bikomponentfibrer av polyeten/polypropen. Med metallocenkatalysatorer kan man framställa elastiska polyetenmaterial vilka används i exempelvis midjeelastik efter att film har framställts. Komponenterna är som tidigare nämnts t ex spärrskikt, som finns i alla typer av absorberande alster, ytskikt, som finns i t ex bindor och trosskydd, midjeelastik i blöjor och fastsättningsanordning, som främst finns i blöjor. Komponenterna som nämns i underkraven beror alltså på vilken typ av alster som i respektive fall avses.

Uppfinningen avser även ett förfarande för framställning av ett absorberande alster såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande, där eten framställes från förnybar råvara, företrädesvis etanol, och polymeriseras till polyeten, att en film innehållande polyeten bildas, att minst en komponent i alstret bildas av filmen, och att komponenten matas in i en maskin tillsammans med en absorptionskropp och eventuella övriga skikt och sammanfogas till det absorberande alstret.

Ett absorberande alster omfattar vanligen ett undre vätskeogenomträngligt spärrskikt, ett därpå liggande absorberande skikt, ett övre vätskeogenomträngligt ytskikt avsett att vara vänt mot användaren, midjeelastisk och fastsättningsanordningar

En livscykelanalys (LCA) består av de steg som ingår i ovanstående förfarande, och dessutom ingår användning av det absorberande alstret och tillvaratagandet av det använda alstret. Vid tillvaratagandet av alstret bryts alstret ned eller förbrännes. CO<sub>2</sub> som bildas under förbränning eller nedbrytning, samt under etanolframställningen, förbrukas i motsvarande mängd vid nybildande av råvaror såsom exempelvis potatis, säd och träd.



Etanol framställs från någon växt, på konventionellt sätt. Därur framställs eten, vilket är beskrivet ovan. Därefter polymeriseras eten till polyeten, vilket också finns beskrivet ovan. Sedan framställs komponenten som ska anbringas i det absorberande alstret. Det kan t ex vara en film som ska bilda ett spärrskikt i ett alster. Filmer kan exempelvis framställas genom filmblåsningsprocess, gjutning eller kylvalsextrudering. Filmen förs sedan in i alstertillverkningen på konventionellt sätt där filmen anbringas i alstret, exempelvis i en maskin för tillverkning av blöjor. Alternativt framställs komponenten på annat sätt, t ex de som används som ytskikt, vilket beskrivs ovan. Efter komponenttillverkning förs komponenten in i alsterframställningen.

Uppfinningen avser även en komponent i absorberande alster, varvid komponenten är t.ex. ett spärrskikt 1,7, ytskikt 3,5, fastsättningsanordning 16,17 eller midjeelastik 18, 23 av ett material innehållande polyeten, där åtminstone en del av polyeten är framställd från förnybar råvara, företrädesvis eten framställd från etanol.

Dessutom avser uppfinningen ett absorberande alster såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande och där minst en komponent är av ett material innehållande polyeten, där polyeten är framställd från förnybar råvara, företrädesvis eten framställd från etanol.

Alstren omfattar vanligen ett undre vätskegenomträngligt spärrskikt 1, 7, ett därpå liggande absorberande skikt 2, 6, ett övre vätskegenomträngligt ytskikt 3, 5, fastsättningsanordning 16, 17 och midjeelastik 18, 23.

Dessa absorberande alster 4, 19, 21 kan förpackas en och en 19 eller flera 21 i samma förpackning 20, 22 av polyetenfilm, som är framställd från förnybar råvara, företrädesvis eten framställd från etanol. När de absorberande alstren 19, 21 är förpackade flera i en större förpackning 22 kan de vara redan inneslutna i en

individuell förpackning 19 eller utan denna förpackning. Förpackning och framställning av förpackningen sker enligt kända metoder.

Uppfinningen avser även absorberande alster där det ensamt 19 eller tillsammans med flera 21 alster är inneslutet i en förpackning 20, 22 av en film innehållande polyeten framställd från förnybar råvara, företrädesvis eten framställd från etanol.

Slutligen avser uppfinningen även en förpackning 20, 22 innefattande en film där filmen är av ett material innehållande polyeten framställd från förnybar råvara, företrädesvis eten framställd från etanol. Materialet kan här, som i alla andra utföringsformer i uppfinningen består helt av polyeten från förnybar råvara eller material innehållande 50-99 % polyeten. Samma exempel på material och andelar som nämnts tidigare gäller även materialet i förpackningen.

Förpackningen framställs enligt konventionella metoder. Till exempel kan film framställas från materialet innehållande polyeten och en förpackning framställas därefter. Som tidigare nämnts behöver förpackningskomponenten inte utgöras endast av film utan kan även bestå av annan komponent.

Förpackningsmaterialet innefattande en polyetenfilm framställd från förnybar råvara kan användas till en valfri förpackning, företrädesvis en förpackning av en absorberande produkt, exempelvis blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande. Men förpackningen kan även avse torkpapper, exempelvis hushållspapper, toalettpapper, torkdukar och liknande. Den förpackade produkten behöver alltså inte vara en produkt innefattande en komponent av material innehållande polyeten framställd från förnybar råvara. Det behöver inte heller vara en absorberande produkt som förpackas.

Uppfinningen avser även användning av ett material innehållande polyeten, framställd från förnybar råvara, för att förpacka olika produkter.

Fördelen med uppfinningen är att den är miljövänlig genom att den innefattar komponenter som är framställda från material innehållande polyeten som i sin tur är framställd från förnybara råvaror. Denna råvara tär inte på samhällets petroleum. Ytterligare en fördel med användning av förnybara råvaror är att växter förbrukar  $\text{CO}_2$  då de bildas och detta medför att växthuseffekten inte ökar om man använder förnybara råvaror i stället för petroleumråvaror i de fall då produkterna förbränns efter användning. Denna fördel gäller även om inte produkten förbränns då den växten redan tagit upp  $\text{CO}_2$  och därmed bidragit till att minska växthuseffekten.

### Patentkrav

1. Användning av ett material innehållande polyeten framställd från förnybar råvara som komponent i ett absorberande alster, såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande.
2. Användning enligt krav 1, **kännetecknad** av att materialet till 100% består av polyetenen.
3. Användning enligt krav 1, **kännetecknad** av att materialet till 50-99 % består av polyetenen.
4. Användning enligt krav 1, **kännetecknad** av att komponenten är ett spärrskikt.
5. Användning enligt krav 1, **kännetecknad** av att komponenten är ett ytskikt.
6. Användning enligt krav 1, **kännetecknad** av att komponenten är en midjeelastik.
7. Användning enligt krav 1, **kännetecknad** av att komponenten är en fastsättningsanordning.
8. Absorberande alster såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande och där minst en komponent är av ett material innehållande polyeten, **kännetecknat** av att polyetenen är framställd från förnybar råvara, företrädesvis eten framställd från etanol.
9. Absorberande alster enligt krav 8, **kännetecknat** av att materialet till 100% består av polyetenen.

10. Absorberande alster enligt krav 8, **kännetecknat** av att materialet till 50-99% består av polyetenen.
11. Absorberande alster enligt krav 8, **kännetecknat** av att komponenten är ett spärrskikt.
12. Absorberande alster enligt krav 8, **kännetecknat** av att komponenten är ett ytskikt.
13. Absorberande alster enligt krav 8, **kännetecknat** av att komponenten är en midjeelastik.
14. Absorberande alster enligt krav 8, **kännetecknat** av att komponenten är en fastsättningsanordning.
15. Absorberande alster enligt något av kraven 8-14, **kännetecknat** av att det ensamt (19) eller tillsammans med flera (21) alster är inneslutet i en förpackning (20, 22) av en film innehållande polyeten framställd från förnybar råvara, företrädesvis eten framställd från etanol.
16. Förfarande för framställning av ett absorberande alster såsom blöja, binda, inkontinensskydd, trosskydd, byxblöja eller liknande, **kännetecknat** av att eten framställes från förnybar råvara, företrädesvis etanol, och polymeriseras till polyeten, att en film innehållande polyetenen bildas, att minst en komponent i alstret bildas av filmen, och att komponenten matas in i en maskin tillsammans med en absorptionskropp och eventuella övriga skikt och sammanfogas till det absorberande alstret.
17. Förfarande enligt krav 16, **kännetecknat** av att filmen bildas enbart av polyetenen.

18. Förfarande enligt krav 16, **kännetecknat** av att filmen bildas av en blandning som till 50-99 % består av polyetenen.
19. Förfarande enligt krav 16, **kännetecknat** av att ett spärrskikt bildas av filmen.
20. Förfarande enligt krav 16, **kännetecknat** av att ett ytskikt bildas av filmen.
21. Förfarande enligt krav 16, **kännetecknat** av att en midjeelastik bildas av filmen.
22. Förfarande enligt krav 16, **kännetecknat** av att en fastsättningsanordning bildas av filmen.
23. Komponent i absorberande alster, varvid komponenten är t ex ett spärrskikt (1, 7), ytskikt (3, 5), fastsättningsanordning (16, 17) eller midjeelastik (18, 23) av ett material innehållande polyeten, **kännetecknad** av att åtminstone en del av polyetenen är framställd från förnybar råvara, företrädesvis eten framställd från etanol.
24. Förpackning (20,22) innefattande en film, **kännetecknad** av att filmen är av ett material innehållande polyeten framställd från förnybar råvara, företrädesvis eten framställd från etanol.
25. Förpackning enligt krav 24, **kännetecknad** av att materialet till 100% består av polyetenen.
26. Förpackning enligt krav 25, **kännetecknad** av att materialet till 50-99% består av polyetenen.

### **Sammandrag**

Användning av ett material innehållande polyeten framställd från förnybar råvara som komponentet i ett absorberande alster, och det absorberande alstret.

Förfarande för framställning av ett absorberande alster där eten framställes från förnybar råvara, företrädesvis etanol, och polymeriseras till polyeten, att en film innehållande polyetenen bildas, att minst en komponent i alstret bildas av filmen, och att komponenten matas in i en maskin tillsammans med en absorptionskropp och eventuella övriga skikt och sammanfogas till det absorberande alstret.

Komponent i absorberande alster av ett material innehållande polyeten, där polyetenen är framställd från förnybar råvara.

Förpackning innefattande en film av ett material innehållande polyeten framställd från förnybar råvara.